WASHINGTON STATE DEPARTMENT OF ECOLOGY

Questions & Answers

Tacoma Smelter Plume Year End 2001

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1. What are arsenic and lead?

Arsenic is a naturally occurring element in the earth's crust. Pure arsenic is a gray and metal-like, but arsenic is usually found combined with one or more other elements such as oxygen, chlorine and sulfur. Arsenic combined with these elements is referred to as inorganic, whereas arsenic combined with carbon and hydrogen is organic arsenic. Many arsenic-containing substances, both organic and inorganic, are naturally occurring. Others are man-made. The organic forms of arsenic are generally less toxic than the inorganic forms.

Lead is also a naturally occurring element. It is a dense, bluish gray metal which was one of the first known elements used by man. Lead ranks about 36th in natural abundance in the Earth's crust.

Arsenic and lead have been found together in soils in the Tacoma Smelter Plume study area. The ores that were smelted for copper at the Ruston smelter contained both metals, which were released into the environment through smokestack emissions during the smelting process.

Much of the information surrounding the Tacoma Smelter Plume site focuses on arsenic issues because arsenic is more commonly found above the state cleanup standard. The state arsenic cleanup standard is 20 parts per million (ppm), while the lead cleanup standard is 250 parts per million.

2. What levels of arsenic and lead have been found in the Tacoma Smelter Plume Area?

At this time, there isn't complete information on the extent or degree of contamination in the plume area. Only a few recent studies have been completed - in University Place, on Maury -Vashon Island and the shoreline of mainland King County. Two of the studies focused on undeveloped areas, which are expected to have higher levels of contaminants since soils have not been moved or mixed up from home building or landscaping. One study (in University Place) focused on residential properties where soil disturbances are more likely. Study results are briefly described below. The results are not directly comparable due to different sampling methods and representation of data (average vs. individual samples), but do give an idea of the ranges of contaminants found. For comparison, the Washington State residential cleanup standards are 20 parts per million for arsenic, and 250 parts per million for lead.

University Place undeveloped properties study:

Arsenic ranged from 90 - 170 parts per million (average for a property) Lead ranged from 170 - 589 parts per million (average for a property)

Maury/Vashon and Mainland King County Shoreline undeveloped properties study:

Arsenic ranged from 3.1 - 460 parts per million (range of all samples - not averaged by property)

Lead ranged from 7.1- 1300 parts per million (range of all samples - not averaged by property)

Maury/Vashon Island Child Use Areas study of developed areas; schools, parks, camps, daycare and preschools and beaches:

Arsenic ranged from 2.8 parts per million (beach composite maximum) to 130 parts per million (day care maximum discrete sample)

Lead ranged from non-detect (close to zero) to 900 parts per million (day care maximum discrete).

University Place residential properties study:

Arsenic ranged from 3.8 - 163 parts per million (average for a property)

Lead ranged from 8 - 227 parts per million (average for a property)

3. Why is the Department of Ecology publicizing the Tacoma Smelter Plume?

Ecology has a legal and ethical obligation to let the public know about contaminated areas, especially involving residential properties. Exposure to soil that is contaminated with arsenic or lead has the potential to cause illness in people. Although arsenic and lead occur naturally in soil, the amount of these elements in the soil at many locations within the Tacoma Smelter Plume is higher than normal. This is a public health concern because many people live in the affected area, and could be exposed to potentially harmful amounts of contaminants. State, local, and federal agencies believe that people deserve to have a clean, safe environment and should be aware of possible hazards that exist. We would be remiss if we did not let the public know that recent investigations revealed soil arsenic and lead levels above state cleanup standards.

The levels of arsenic and lead found on Vashon-Maury Islands and in University Place do not pose an imminent threat to public health *provided that Ecology's suggested measures for limiting exposure are followed* (See question 12). However, Ecology is concerned about long-term exposure to arsenic and lead, especially for children. Children under six are the population most at risk for arsenic and lead exposure because they play directly in dirt where they can ingest contaminated soil through their mouths and inhale dust through their noses. (*See questions 7, 9 and 10 for further details*). Arsenic is a known human carcinogen, and lead can result in developmental disabilities in children.

4. How big is the Tacoma Smelter Plume?

One likely source of the arsenic and lead contamination in Pierce and King Counties was the now-closed Asarco copper smelter in Ruston, which operated between 1905 and 1986. The property of the smelter and immediately surrounding lands were declared an Environmental Protection Agency Superfund site in 1983. The soil contaminants derive from smelter smokestack emissions and were likely wind borne far from the smelter itself. We do not know how far from the smelter the contamination is deposited. The prevailing wind direction in the area of the smelter is southwest-to-northeast in winter and northeast-to-southwest in summer, therefore areas of Pierce and King Counties in those directions from the smelter are likely to be affected the most.

The Department of Ecology and Tacoma-Pierce County Health Department will be conducting a study in 2002 to evaluate the extent, or "footprint" of the plume in Pierce County. A study of the King County mainland is scheduled for release in the spring of 2002. The footprint studies will concentrate on undeveloped/undisturbed and developed properties to provide the most accurate picture of the area that was influenced by the smelter.

Preliminary data indicate that elevated arsenic is found in soils as far away from the smelter as the town of University Place to the south, and I-90 to the north. Higher contamination is found closer to the smelter.

5. What are other sources of arsenic in soils?

Ecology believes the wide spread contamination in the Tacoma Smelter Plume is from airborne emissions from the Asarco copper smelter in Tacoma. Other sources of arsenic that could affect individual properties include fertilizers and pesticides. Lead arsenate pesticides were historically used on orchards to control moths and are known to have caused soil contamination. Fertilizers that contain arsenic and lead are still on the market. One type of commercially available fertilizer, Ironite, has tested at over 4,000 parts per million arsenic and 2,900 parts per million lead. (To learn more about state cleanup standards and references to background soil levels, go to Question 14). Places where these fertilizers or lead-arsenate pesticides have been used can be expected to have contaminated soils. Other common sources of lead include lead particles from vehicle air emissions, which we can distinguish from the smelter air emissions. See question 7 for further information.

We recommend that residents wishing to identify low-arsenic and lead soil amendments contact the Washington Toxics Coalition, which has been working on the issue of soil amendments for some time. The coalition's hotline is 1-800-844-SAFE. The website address is: http://www.watoxics.org/tf.htm

6. How might I be exposed to the contaminated soil?

Exposure will occur only if someone ingests or inhales the contaminated soil. Getting contaminated soil on the skin is not considered a risk, since arsenic and lead in the soil are not absorbed very well through the skin. The main concern is that some people may swallow contaminated soil, especially young children who are unaware of the hazards and are likely to be exposed to the contaminated soil through normal play activities. Most young children put their hands, toys, or other objects in their mouths, and these often have small amounts of soil and dust on them that the child swallows. Some children directly swallow large amounts of soil. Older children and adults can also swallow small amounts of soil that is on hands, food, or other objects that come into contact with the mouth. Also, contaminated dirt or dust that is suspended by wind, lawn mowers, leaf blowers, vacuum cleaners, and other means can get into a person's nose or mouth and be swallowed or inhaled.

7. What are other sources of exposure to arsenic and lead?

Arsenic

Arsenic cannot be destroyed in the environment. It can only change its form. Arsenic in air will settle to the ground or is washed out of the air by rain. Many arsenic compounds can dissolve in water.

There are many sources of arsenic to which people may be exposed. In addition to smelter related arsenic, possible sources include:

- Natural mineral deposits may contain high levels of arsenic, which could result in exposure through contaminated drinking water.
- Food usually constitutes the largest source of arsenic intake (about 25-50 micrograms per day-a microgram is one millionth of a gram).
- Fish and shellfish can accumulate arsenic, but the arsenic in fish is mostly in a form not considered harmful.
- Fish consumption, however, is a concern for subsistence, low-income and tribal communities who rely heavily on this food source. Agencies rely on assumptions about fish consumption rates, practices and needs that reflect the circumstances of the general population. These assumptions often are not reflective enough of the amount of fish consumed by low-income and tribal communities.
- Improperly stored or arsenic contained at some waste disposal sites, may escape into the water, increasing chances that nearby residents might be exposed.
- Low levels are found in most fossil fuels (oil, coal, gasoline and wood.) So burning of these materials (in power stations, furnaces, stoves, automobiles) results in low levels of inorganic emissions into the air.
- There are low levels of arsenic in cigarette smoke; arsenic is inhaled through burning sawdust or wood that is chemically treated.
- The main use of arsenic in this country is for pesticides. Widespread application of pesticides may lead to water or soil contamination, possibly exposing residents in the area.
- Arsenic is also used in chrome-copper-arsenate (CCA) treated wood (found in wood decks and children's play equipment), aniline dyes, some glass products and in semi-conductors.

Lead

Lead itself does not break down, but lead compounds are changed by sunlight, air, and water. When lead is released to the air, it may travel long distances before settling to the ground. Once lead falls onto soil, it usually sticks to soil particles. Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil. Much of the lead in inner-city soils comes from old houses painted with lead-based paint or from leaded gasoline combustion residues near transportation corridors.

We hear about children being tested for elevated levels of lead in blood. Children's bodies absorb toxins differently than adults: children take in more toxins per pound of body weight, and contaminants tend to remain within the child's system. In contrast, adult systems process the chemicals differently (see #11, Is there a medical test to determine if I have been exposed to arsenic or to lead?)

Exposure to lead comes from:

- Eating food or drinking water that contains lead.
- Spending time in areas where lead-based paints have been used and are deteriorating.
- Working in a job where lead is used.
- Using health-care products or folk remedies that contain lead.
- Engaging in certain hobbies in which lead is used (for example, making stained glass, fishing jig or weight casting, or bullet casting).
- Exposure to air borne particles from leaded vehicle emissions.

Suspect soil lead contamination if a garden is:

- within 20 feet of older buildings or structures once painted with lead-based paints.
- within 100 feet of roadways and parking areas, particularly near high traffic routes
- within one mile of existing or former smelters, fossil fuel-fired electrical power plants, or cement manufacturing facilities.
- planted on a pre-1947 orchard site.
- planted on or near tailings from current or former metal ore mines.

8. What are the odds that I will get sick?

The risk of developing health problems from the contaminated soil is different for each person and depends mainly on three things:

- how sensitive the person is to the arsenic and lead,
- how much exposure the person has to the contaminate, and
- how much arsenic and lead are in the soil to which the person is exposed.

Unfortunately, it is difficult to predict someone's risk because there is no practical way to measure his or her sensitivity and exposure. The main concern is that ongoing exposure over a long period of time could lead to health problems in some people. From what we know about levels of arsenic and lead in the Smelter Plume soil, the likelihood that someone will get sick is relatively small. However, some people who are more sensitive to the contaminants or who have greater than normal exposure may have significantly greater risk. It is likely that genetics plays a role in sensitivity. Pre-existing health problems or smoking may make one person more sensitive to exposure than another. Since we cannot predict who is at greatest risk, we suggest that all people take steps to minimize their exposure to the contaminated soil. (*see question 12, What can I do to reduce exposure for my family?*)

People who work in the garden frequently or children who play outside on bare soil may have higher risk than those who don't because of greater likelihood of exposure. Higher concentrations in the soil are associated with greater risk than lower concentrations.

Arsenic and lead contamination from the Tacoma Smelter Plume is spread over a large area and is expected to remain in the soil for hundreds to thousands of years. Although the risk of health effects is small for an individual, the very large number of people who could be exposed over such a long time period suggests that exposure to contaminants in the

Tacoma Smelter Plume is a significant public health problem *over the long term*. It would be easier and less costly to conduct targeted public health efforts if we could identify the high-risk individuals. Unfortunately, we can't identify them and the uncertainty about whom in the population is at higher risk requires us to develop widespread generic solutions if our goal is to effectively protect the population from contamination.

9. How can arsenic affect my health?

The amount of arsenic intake that is required to cause a harmful effect depends on the form of the arsenic. In general, inorganic forms are more toxic than organic forms, and those that dissolve easily in water (soluble forms) tend to be more toxic than those that dissolve poorly in water. Most ingested arsenic is quickly absorbed through the stomach and intestines and enters the bloodstream, although this varies for different chemical forms of arsenic. Arsenic does not have a strong tendency to accumulate in the body except at high exposure levels (in excess of 100 parts per million).

Ingestion of inorganic arsenic has been reported to cause more than 30 different adverse health effects in humans, including: decreased production of red and white blood cells, abnormal heart function, blood vessel damage, liver damage, kidney damage, diabetes mellitus, impaired nerve functioning and various forms of cancer. However, since each of these health problems can have different causes unrelated to arsenic, it would be difficult to determine for certain whether they had been caused by the contaminated soil or an unrelated factor. Based on what we know about the toxicity of arsenic, and the soil concentration levels identified to date in the Smelter plume area, the most likely health effect would be a small increased risk of cancer. The cancers most commonly associated with arsenic exposure are liver, bladder, kidney, lung, and non-melanoma skin cancer.

Smelter studies indicate that workers exposed to arsenic inhalation have an increased frequency of lung cancer. This has been observed in people exposed to high levels of airborne arsenic in or around smelters.

Direct dermal contact with arsenic compounds, frequently from inorganic dusts in air, may result in mild to severe irritation to skin, eyes, and throat.

10. How can lead affect my health?

Lead taken internally in any of its forms is toxic; the effects are usually felt after it has accumulated in the body over a period of time. Children are especially at risk from lead. Long- term low-level exposure to lead in children may reduce intelligence, delay motor development, impair memory; result in behavior problems, hearing problems, and trouble with balance. Lead exposure in adults is linked to kidney problems, reproductive problems and elevated blood pressure. As with arsenic, these health problems have many different causes not related to lead, making it difficult to determine whether they have been caused by the contaminated soil.

11. Is there a medical test to determine if I have been exposed to arsenic or to lead?

Most arsenic stays in the body only a short time, and measuring the levels of arsenic in urine is the best way to evaluate exposure that occurred within the last 1 - 2 days. The most common urine test is for total arsenic and does not distinguish between the less toxic organic forms that are commonly found in fish and some other foods and the toxic inorganic forms of arsenic that are of health concern. High test results could occur by eating fish or other foods with high levels of the relatively nontoxic organic arsenic compounds 1 - 2 days before this test. Instead, a test for "speciated" arsenic measures exposure to just the inorganic forms of arsenic and is better for evaluating exposures relevant to your health. Measurement of arsenic levels in hair or fingernails can be useful to evaluate longer-term exposure to arsenic, but

- these tests are usually hard to interpret because they are not common medical tests,
- there are no standards for conducting the tests, and
- there are no comparison values that scientists have agreed upon that indicate normal or abnormal exposures.

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for potential chronic lead poisoning. The US Centers for Disease Control and Prevention considers children to have an elevated level of lead if the amount in the blood is at least 10 micrograms per deciliter. Small children drink more water, eat more food, and breathe more air per pound of body weight. For example, children between one and five years old eat three to four times as much food per pound than the average adult. This increases their likelihood of exposure to lead. Adults have a greater capacity to pass lead through the bloodstream. For this reason we emphasize testing children for blood lead levels, and tend to not find significant accumulations in adults.

Public Health - Seattle and King County led an effort to sample blood in Vashon-Maury Island children, none of whom were found to have elevated levels of lead in their blood.

For further details on lead blood levels in children, see the Interim Action Trigger Levels for Arsenic and Lead Question and Answer document at
http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/ts_hp.htm

12. What precautions can I take to reduce the exposure for my family?

Preventing exposure to potentially contaminated soils is considered the most sensible approach. Children are more likely than adults to be exposed to arsenic and lead in soils and dust; preschool children are the most vulnerable to contaminated soil exposures. Factors contributing to this exposure include: 1) greater likelihood for children playing in dirt to place their hands or objects in their mouths; and 2) greater likelihood of children to have gaps in their diet that can increase lead and arsenic absorption. Children's exposure to contaminated soil should be limited as much as practical.

- Children should not play in the dirt. Cover play areas with clean soils and grass, or some material to limit child's exposure.
- Encourage children and family members to wash their hands and faces after being outdoors and before eating or drinking.
- When gardening or working in contaminated soil, wear clean, protective clothing (coveralls, long sleeve shirt and pants) shoes and gloves. Moisten soil to reduce dust. If dust is generated, wear a dust mask.
- Remove shoes before entering the house. Place “wipe-off” mats at all entry-ways into the house.
- Avoid eating, drinking, smoking or chewing any material while working in the soil.
- Wash work clothes separately from other clothing.
- Damp mop and dust your house frequently to reduce your child's contact with dust.
- Minimize children's exposure to hobbies that use lead (lead soldering or painting)
- Make sure your child eats a well-balanced diet: (Those who have iron, calcium and low fat diet are less likely to absorb lead from their environment)
- Maintain the painted surfaces in your home (if it was built prior to 1980) to avoid exposure to lead paint chips and dust.
- Keep pets clean when allowed indoors.

13. What is Ecology doing to address possible arsenic and lead in child use areas, such as schools and parks?

Protecting children from exposure to elevated levels of arsenic and lead is one of Ecology's primary concerns for the Tacoma Smelter Plume. Levels of arsenic and lead appear to be higher in soil that has not been tilled or moved (such as playgrounds or ball fields that have not been landscaped or tilled since before the smelter stopped operating). Exposure is less likely in areas covered with wood chips, paving or gravel, and in areas which have been developed or modified since the smelter stopped operating in 1986.) Several activities regarding "child use areas" (parks, schools, day cares, camps) are currently underway or planned:

- A study of child use areas, including parks, camps and daycares, is near completion on Vashon - Maury Island (draft published by Public Health- Seattle and King County, June, 2001.)

  The highest concentration of arsenic found in the study was 130 parts per million. Average arsenic concentrations in the top six inches of soil for the 34 child-use areas tended to be much lower — ranging between 4 to 50 parts per million. [The state cleanup standard for arsenic in residential soils is 20 parts per million.] The highest concentration of lead found in the study was 900 parts per million. Again, average lead concentrations in the top six inches of soil for the 34 child-use areas tended to be much lower — ranging between 8 to 180 parts per million. [The state cleanup standard for lead in residential soils is 250 parts per million.]
- Tacoma-Pierce County Health, with funding from Ecology, plans to sample additional child use facilities in targeted areas over the next few years.
- Ecology developed Interim Action Trigger Levels for arsenic and lead in child use areas. The Interim Action Trigger Levels help Ecology prioritize interim cleanup decisions for child-use areas such as schools, daycare centers, parks, campgrounds and

beaches. While state cleanup standards are based on an unacceptable cancer risk of one-in-one million, the Interim Action Trigger Levels are based on an unacceptable cancer risk of one-in-ten thousand. For details describing how and why these levels were set, see the *Interim Action and Cleanup Levels Q&A document at http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/ts_q_and_a.pdf*

- Ecology will pursue remedial actions at Child Use properties that have average soil concentrations in excess of the Interim Action Trigger Levels: For schools and day cares, 100 parts per million for arsenic, and 700 parts per million for lead; for parks and camps, 200 parts per million for arsenic, and 1000 parts per million for lead. At present funding for remedial actions is limited.
- Depending on what we find, it could take many decades to address contamination in the Tacoma Smelter Plume. Ecology strongly recommends adoption of the preventive measures listed in question #12 to reduce exposure to contaminated soils.
- Ecology is available to provide technical assistance for local governments and individuals who wish to conduct their own sampling or cleanups. The technical assistance program is fee-based and is called the Voluntary Cleanup Program.
- Local government entities can apply for grant funds now as there may be funds awarded in June, 2002 for partial reimbursement for cleanups that were completed. However, funding is limited and early application is encouraged. There will be additional funds available for fiscal year '03-'05. Contact Ecology to receive an application. These grants are limited to 50% of the project cost.

14. What is the Washington State Cleanup Standard for Arsenic?

The Model Toxics Control Act (MTCA) residential cleanup standard for arsenic is 20 parts per million (parts per million). Under MTCA, cleanup levels for cancer-causing chemicals such as arsenic are usually set to protect the population against increased cancer risk. For arsenic, the calculated risk-based number would be 0.67 parts per million to protect against an additional cancer per one million people. However, arsenic occurs naturally in the environment at background levels that are higher than the risk-based level of 0.67 parts per million. Therefore, the state arsenic cleanup level was set at the background level of 20 parts per million.

For more detailed information on state cleanup standards and how they were developed, please refer to: Questions and Answers - Tacoma Smelter Plume Site - Cleanup Levels and Interim Action Trigger Levels for Arsenic and Lead.
http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/ts_q_and_a.pdf

15. Why is the federal residential arsenic action level 230 parts per million at the Asarco Tacoma Smelter Superfund Site in Ruston, but the state residential level is 20 parts per million?

The Asarco Tacoma Smelter site in Ruston near Tacoma is a federal Superfund site managed by the Environmental Protection Agency (EPA). At the Ruston site, EPA established a cleanup level of 20 parts per million (based on the MTCA cleanup level) with an action level of 230 parts per million. What this means is:

- No action is required for properties with levels below 20 parts per million;

- Community education, such as suggesting people voluntarily reduce their exposure, is required for properties with levels between 20 and 230 parts per million; and
    - Soil removal is required for properties with levels above 230 parts per million.

Ecology and EPA utilize similar risk assessment methodology. However, Ecology and EPA use different acceptable risk levels, which explains some of the differences between Ecology's cleanup levels and EPA's action levels.

Federal law does not have standardized cleanup levels per se. Under Superfund, risks are managed within an acceptable risk range for each individual site. Federal regulations specify this range as between a one-in-one million (same as the MTCA standard) to one-in-ten thousand increased risk of cancer. EPA guidance also provides that the one-in-ten thousand risk can include estimated risks slightly above one-in-ten thousand if justified based on site-specific information. At Ruston, the allowable cancer risk was set at one-in-two thousand, resulting in an action level of 230 parts per million.

The *action level* is the level at which active cleanup (soil removal for example) is required. The MTCA cleanup level of 20 parts per million still applies at the Ruston site as an "applicable" state law. Thus, for levels between 20 parts per million and 230 parts per million, safety measures other than active cleanup (such as community education about health protective measures individuals can take) are required to reduce exposure to soils contaminated above the MTCA cleanup level.

A recent review of cleanup levels set for arsenic at other federal cleanup sites found that 84 percent of the sites had cleanup levels based on risk, and 16 percent were based on background levels. The cleanup levels based on risk ranged from 2 to 305 parts per million, while the background levels ranged from 8 to 21 parts per million.

16. What is the Washington State Cleanup Standard for Lead?*

The lead cleanup level of 250 parts per million was developed in 1991 and is based on protecting children against the toxic effects of lead. Infants and small children are particularly vulnerable to the effects of lead poisoning because lead adversely affects the developing brain and other parts of the nervous system. Also, children usually have greater exposure to lead than adults do because they tend to swallow more lead-contaminated material and absorb a much greater fraction of the lead that has been swallowed. A child's risk is evaluated by levels of lead in their blood. The state cleanup level was developed using a mathematical model to determine concentrations of lead in soils that would have less than a 1 percent chance of causing blood lead levels above 15 micrograms of lead per deciliter of blood.

For more detailed information on state cleanup standards and how they were developed, please refer to: Questions and Answers - Tacoma Smelter Plume Site - Cleanup Levels and Interim Action Trigger Levels for Arsenic and Lead.
http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/ts_q_and_a.pdf

17. What is Ecology doing now to address the Tacoma Smelter Plume contamination?

We believe the Tacoma Smelter Plume covers a very large area and contains a huge number of properties. Fully addressing the problem will take many years. Ecology plans to work with local governments and citizens as we best determine how to address the clean up issue. Currently, Ecology is taking several steps to begin defining and addressing the problem:

- Ecology has provided 3.2 million dollars to fund Site Hazard Assessments in King and Pierce Counties. The Site Hazard Assessments are focused on three objectives.
    - We are collecting soil samples in King and Pierce counties to determine the extent of the arsenic and lead contamination that may have resulted from the emissions from the Tacoma smelter.
    - Second, as it will take many years to develop and implement remedial solutions for the whole Tacoma Smelter Plume site, Ecology is identifying the need for any early remediation. Our efforts are focused at reducing exposure to contaminants in areas used by children, such as schools, daycare centers, parks, campgrounds, and beaches.
    - Third, Ecology is focused on gathering sufficient credible evidence to identify the potentially liable party(s). Ecology will notify any party(s) of their potential liability, and request their participation in the investigation and cleanup of the Tacoma Smelter Plume site.
- In addition, the legislature allocated $1.2 million to begin policy development for arsenic and lead soil contamination *statewide. This project is known as the Area-wide Contamination Strategy Project*. As part of the Area-wide Contamination Strategy Project, Ecology will be developing:
    - Standardized sampling guidance for property owners (will be available mid-2002.)
    - Model remedies, or solutions to widespread soil contamination (will be available by July 2003).
- Ecology provides technical assistance through the Voluntary Cleanup Program for property owners who wish to sample or clean up their properties. The technical assistance program is fee- based. For more information, refer to: http://www.ecy.wa.gov/programs/tcp/VCPmain.htm.
- Ecology is developing the public participation plan for the Tacoma Smelter Plume site. This document will go out for public review in early 2002.
- Ecology is assembling credible evidence to name the Potentially Liable Party(s) and to request assistance with contamination identification and costs associated with the cleanup process.
- Ecology is developing a strategy for addressing the widespread soil contamination within our state cleanup regulation, the Model Toxics Control Act (MTCA). As this is a large site with many impacted communities, we need a framework for completing the formal MTCA site cleanup process, while providing the needed flexibility for developing solutions to this large complex cleanup project.

18. What is the Area-wide Soil Contamination Strategy Project?

The Area-Wide Soil Contamination project is forming to develop a statewide strategy for addressing widespread soil contamination, with an initial focus on arsenic and lead. This effort involves the Washington State Departments of Ecology, Health, Agriculture and Community Development. This project purpose is to explore ways of dealing with cleanup sites that cannot be met through traditional methods (more timely and comprehensive solutions are needed.) The project is initiated to expand solutions beyond traditional cleanup processes and agency boundaries; and to facilitate any policy or resource shifts needed to implement solutions. The work groups engaged to explore soil contamination issues will develop recommendations for the state agencies to define:

--how big the problem is in Washington State;
--safe, effective ways to implement model remedies, and
--better coordination, organization, resource utilization and standardized requirements.

19. What studies have been done?

- Public Health – Seattle & King County and Glass, Gregory L., Vashon-Maury Island Soil Study, July, 2000. Also see: http://www.metrokc.gov/health/hazard/soilsamples.htm.
- Public Health – Seattle & King County and Glass, Gregory L., Vashon-Maury Island Child-Use Areas Study, July, 2001. http://www.metrokc.gov/health/hazard/vmicancerreport.pdf.
- Public Health – Seattle & King County, Vashon-Maury Island Children Blood Lead Screening (PHSKC, not published). No unacceptable levels of lead were identified in children's blood.
- Public Health – Seattle & King County, Washington State Departmentt of Ecology and Washington State Department of Health, Review of Available Data on Types of Cancer Related to Arsenic Exposure: Washington State and Washington State Counties 1980-1998, January, 2001.
- Washington State Department of Ecology, Steven Golding, Survey of Typical Soils Arsenic Concentrations in residential Areas of the City of University Place, March, 2001. Also see: http://www.ecy.wa.gov/biblio/0103008.html.
- City of Tacoma Dept. of Public Utilities, and Gregory L. Glass, 1999. University Place Water Tanks Site, University Place, Washington, Draft Report, Area Background Study and Evaluation of Site Cleanup Status. Washington State Department of Ecology under Agreed Order No. DE98TC-S106. June 1999.

20. What can property owners do to test their property?

Ecology will be developing standardized sampling guidance next year. In the meantime, Public Health - Seattle & King County has developed some guidance for residents who wish to sample their soils. This information can be found at:
http://www.metrokc.gov/health/hazard/soilsamples.htm#resident
This sample guidance is intended to provide a general idea of property contamination, and does not meet Model Toxics Control Act (MTCA) criteria for fully investigating a property.

Typical cost for soil samples of arsenic and lead are around $60- $80 per sample (includes arsenic and lead). Because of the high variability of concentrations even within a small area, one or two samples will not give an accurate picture of the contamination. Taking multiple samples will provide a more realistic assessment of overall contamination.

Again, preventing exposure to potentially contaminated soils is a primary recommendation.
If property owners want to test their property, we recommend they contact laboratories accredited by Ecology. For a list of environmental laboratories accredited by Ecology, see http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/ts_hp.htm.

21. Will I be required to clean up my property?

At this time, Ecology does not plan to require individual homeowners to clean up their yards, unless a situation arises which could pose immediate and serious impacts to health, under likely exposure scenarios. Other situations, such as selling a property or installing new landscaping, may prompt a homeowner to clean up their yard. Ecology is available to provide technical assistance, for a fee, for private cleanups. See http://www.ecy.wa.gov/prograrns/tcp/VCPmain.htm (or call Joyce Mercuri for Pierce County questions at 360-407-6260 and Norm Peck, Site Manager for King County, at 425-639-7049).

Real estate law requires disclosure of known contamination on Form 17 (Chapter 64 RCW 64.06.020). As a buyer/seller you may want to consult with a real estate attorney. If you are interested in finding out more about hazardous waste and real estate transactions, contact Molly Gibbs at 360-407-6179 for referral information. Property owners may attempt to recover costs incurred when conducting a MTCA-equivalent remediation from Liable Parties under (WAC 173-340-545). You are advised to consult a qualified environmental attorney if you wish to pursue this option.

Ecology is consulting with a variety of professionals to elicit concerns and recommendations for TSP policy development, specific to property ownership.

22. Where will funding for cleanup come from?

For public property owners Ecology can provide funds through Remedial Action Grants. For this biennium (2001-2003) $700,000 has been set aside for Voluntary Cleanup remedial action grants statewide. The Voluntary Cleanup grants are to *reimburse* governments for monies spent for cleanups of public properties, and are limited to $100,000 per project. Applications for these funds will be evaluated in June, 2002.

Most remedial action grant money for this biennium is earmarked, for non-VCP grants, but some money could become available. It is recommended that local governments apply for funds now. Applications for these grants help us seek appropriation from the legislature for the coming biennium.

Currently, public funding is not available for remediation of private properties within the Tacoma Smelter Plume area. Therefore, remediation must be funded through private

means. A private right of action exists under the Model Toxics Control Act for the recovery of remedial action costs from liable parties (RCW 70.105D.080). Persons interested in pursuing such actions should seek private legal advice.

TSP is one of many priorities within the Toxics Cleanup Program fiscal budget. We look next to pursuing the Potentially Liable Party for funding specific elements of the MTCA process, and to the legislature for the '03-'05 budget. We recognize the state budget is stretched to meet competing priorities.

23. Does this affect my vegetable garden?

The primary concern with vegetables and fruits is taking in soil that might be on the produce. That can be avoided through careful washing. The amount of arsenic and lead in produce grown in contaminated soil is usually much lower than the amount in the soil itself.

Soil intended for garden use should be tested for arsenic and lead (see Washington State University Agricultural Extension bulletin 1884 http://cru.cahe.wsu.edu/CEPublications/eb1884/eb1884.pdf recommends the following:

- Wash garden crops with water before bringing them in the house
- Wash it again carefully once inside with edible soap or detergent and a scrub brush to remove any remaining soil particles
- Pare root and tuber crops and discard the peelings
- Do not compost unused plant parts, peelings or parings for later use in the garden
- Maintain soils containing both lead and arsenic at pH7 to minimize plant uptake of both elements.

Gardeners can consider:

- Avoiding use of pressure-treated lumber that contains arsenic and copper.
- Building raised beds using low lead and arsenic soil. Test new soil before using it.
- Digging up and replacing the existing contaminated soil with non-contaminated soil. (Use precautions while working in the soil).
- Growing only ornamental plants.

24. What do I do when I work in the soil? What are worker safety concerns?

Employees who work in soil should refer to WAC 296-62 (the General Occupational Health Standard) or consult with the Department of Labor and Industries for assistance on how to reduce work-related exposure to contaminated soil. Employers are responsible for identifying the proper health and safety requirements at their work sites and properly implementing them.

There are specific training requirements for people working within contaminated sites. These requirements are often difficult to implement in a large area with widespread contamination.

Some suggestions to reduce exposure include:

- Avoid eating, drinking, smoking or chewing any material while in a contaminated work area
- Wash hands and exposed skin after working with soil and before eating, drinking, smoking or chewing any material
- Moisten soil to keep dust down (avoid over-watering and causing erosion and/or off-property migration of contaminated soil)
- Wear clean full-body protective clothing, shoes and gloves
- Wash work clothes separate from other clothing
- Wash hands and exposed skin after working with soil and before eating or drinking.

If dust is generated, wearing a dust mask or respirator may be advised.

Employers and employees with health and safety questions may contact:

- In King County contact Mac Davis davm235@lni.wa.gov, or call 206-281-5442
- In Pierce County, contact Don Lofgren lofg235@lni.wa.gov or call 253-596-3908

25. Does arsenic or lead from the Tacoma Smelter Plume soil contamination pose a threat to drinking water?

Based on the results of the Vashon-Maury Island Undisturbed Areas and Child Use Area studies (PHSKC, 2000 and 2001), the Glacier NW Gravel Pit soil results and soil borings, it appears that downward migration of arsenic and lead in the soil is very slow. The maximum depth to which elevated arsenic contamination has been discovered to date is about 18-24 inches (Glacier NW gravel pit soil sampling). Since drinking water is generally withdrawn from significantly greater depths, no impacts from near-surface contamination from the Tacoma Smelter Plume is anticipated. Ecology has received no reports of elevated drinking water arsenic levels attributable to TSP contaminated soils. There is some potential for impacts to poorly constructed, shallow dug wells, surface water withdrawals and infiltration gallery-type supplies. No data has been collected to date for shallow, seasonal "perched" or saturated soil interstitial water. Some elevation of metals concentrations in those shallow soil interstitial (between soil particles) water conditions is possible.

When the smelter was still operational there were also reported impacts to cisterns (systems that collect rainwater from building roofs for use as domestic and/or drinking water). Old cisterns may contain residual stack particulates if they have not been cleaned after smelter operations ceased.

26. How do I find out if my private well or water supply has metals contamination in the water?

The presence or absence of arsenic and/or other metals (e.g. lead, cadmium, mercury, etc.) is determined by analytical testing of a properly collected water sample at a certified lab. The Washington Department of Health, Seattle Drinking Water Office, can provide the names of laboratories certified to conduct drinking water analysis for inorganic contaminants, which includes heavy metals. See the Department of Health website at http://www.doh.wa.gov/ehp/dw/.

If you are connected to a public water supply, your water provider can provide information about how frequently water in the system is tested, when the last test was done, and what the results were. If you obtain drinking water from a private well or other water supply, you must do your own testing if you want to know if there is arsenic or other metals in your water. There are no specific testing or reporting requirements imposed by the government.

27. How does arsenic get into drinking water if it's not from soil contamination?

Many aquifers (reservoirs of underground water) in western Washington have arsenic in the water. The level of arsenic varies from very small traces to very high levels that make the water dangerous to drink. This arsenic comes from rocks that underly the entire area. This arsenic is not associated with shallow soil contamination, but with the very "bedrock", and as such is not a part of the TSP study.

For further information about drinking water and soil contamination from heavy metals, please contact Jim W. White, toxicologist with Washington State Department of Health at 360-236-3192. You can also reach him at Jim.W.White@doh.wa.gov.